INFANT INCUBATOR
BB-200
Lux + Phototherapy

MANUAL BOOK

Elitech® TECHNOVISION

Contents

1 Summary

It is the advanced technology in such disciplines as comprehensive clinical medicine, machinery, computer automatic control, sensor, etc. that the baby in incubator, offers newborn baby and disease baby to a fine environment where air purify, temperature and humidity is suitable, similar to uterus of the parent. The temperature of cabin space of the baby in incubator should be set up on the doctor's order, Baby's skin temperature, baby's air temperature of the cabin and baby's humidity of the cabin have digital display, when baby's skin temperature and air temperature of the cabin over the normal value or present other unusual situations, there is alarming (power cut off, fan failure, sensor trouble, air temperature over, skin temperature over, deviation between display temperature and setting up temperature, etc.), guarantee the dependability and security of the one machine.

This manual includes two parts of operation instruction and technical specification, and is suitable for BB-200 Lux + Phototherapy infant incubator to install, use, maintain, common trouble analysis and get rid of, etc.

2 Definition and Symbol

2.1 Definition

2.1.1 Air temperature control

The air temperature of baby's compartment is automatically controlled by an air temperature sensor close to a value set by the user.

2.1.2 Skin temperature control

The air temperature of baby's compartment is automatically controlled by a skin temperature sensor that is stuck on baby's skin close to a value set by the user.

2.1.3 Incubator temperature

The temperature of the air at a point 10 cm above the center of the surface mattress in the baby compartment.

2.1.4 Control temperature

Temperature selected at the temperature control (the temperature needed of baby's compartment).

2.1.5 Skin temperature sensor

A sensing device intended to measure the baby’s skin temperature.

2.1.6 Skin temperature

The temperature of the skin of the baby at a point on which the skin temperature sensor is placed.

2.2 Symbol

	On of power switch Off of power switch		Attention, consult accompanying documents
	Protective earth (ground)		Beware of electric shock
	Fuse		Direct Current
	Close (function switch)		Clockwise down, anticlockwise up

	Bilateral rotation		Alternating current
	Type BF applied part		Audio paused
	Set up increase		Set up reduce
	The keyboard locks the key		Alarm reset button
	High priority alarm		Low priority alarm
	To set the temp greater than 37°C		During phototherapy, infants must be protected by wearing goggles
	Battery		Low water level alarm indicator
	Timer reset button		Read manual book
	Operation instruction		Do Not Dispose
	Standar Nasional Indonesia		

3 Use

3.1 Early newborn baby, the getting critically ill ones, the getting sick and weak ones are cultivated by the constant temperature;

3.2 The body temperature of the early newborn baby, the getting critically ill ones, the getting sick and weak ones, recovers, infusion, rescuing, observing in hospital, etc.;

3.3 The normal baby that left parent is cultivated in the baby incubator to adapt progressively to the transition and suit, in order to reduce the discomfort the environment that caused by the environment change.

3.4 Phototherapy is used for the treatment of neonatal hyperbilirubinemia.

3.5 Baby Scale is used to monitor the baby's weight accurately and continuously without having to remove the baby from the incubator, especially for premature babies or babies who need intensive care.

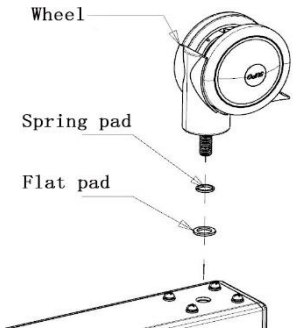
4 Installation (see Fig.4-3)

Notice: For ensure safety, should at least 3 people finished the installation.

Notice: Must after removing 4 set bolts from wooden case bottom with the spanner, then take out the controller

and the cupboard.

4.1 Install four wheels on the bottom of the cupboard and fix tightly with spanner



4.2 First use “one” type screwdriver discharge the bolt, and then put constant temp hood on the control cabin, then fix lock the locking bolt on the support fixed block by support locking plate (as Fig.4-1)

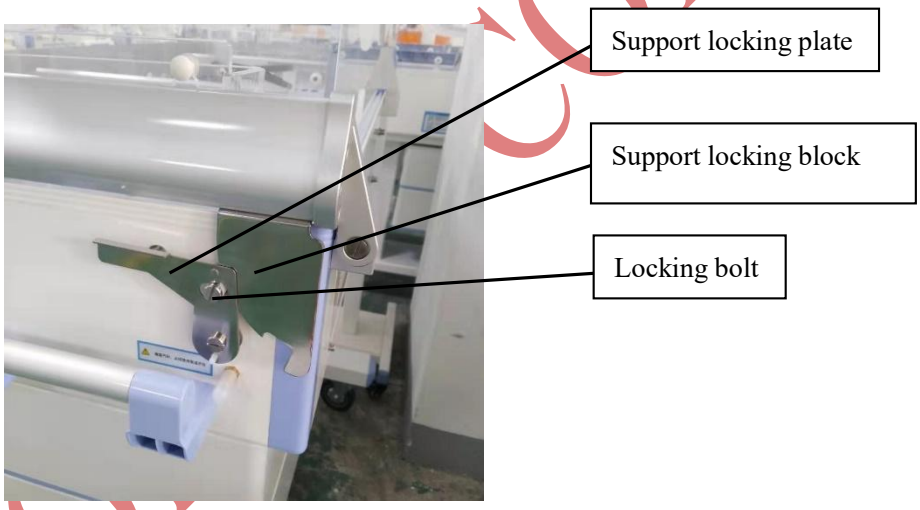


Fig. 4-1 fixed constant temp hood

4.3 Fixed the infusion support and tray module on the control cabin with inner hexagon socket screw. (use two piece M8×30 inner hexagon socket screw)

4.4 Unscrew the rotary knob on the infusion pole, after adjust the high and direction, screw fixed it again, use inner hexagon screw loosen four bolt of configuration tray equipment, put tray on the infusion pole and fixed it.

4.5 Lifting the constant temp hood, stuck the front pull type plastic tray baby bed on the shake table, put on mattress, press down support locking plate, constant temp hood will closed after self-locking bolt break away from limit.(as chart 4-2)

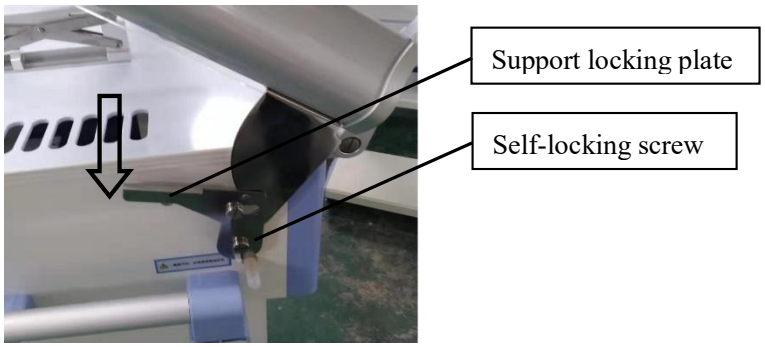
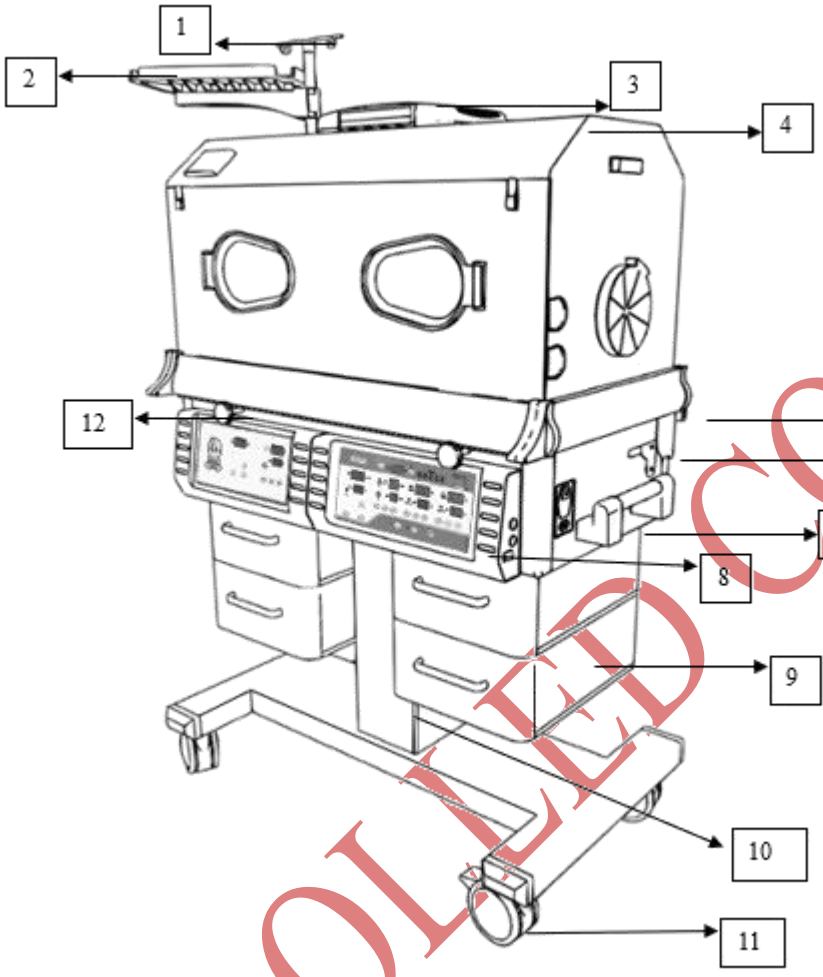


Fig. 4-2 closed the constant temp hood



① Infusion hook
② Tray
③ Phototherapy
④ Constant temp hood
⑤ Support locking block
⑥ Self-locking bolt
⑦ Handle
⑧ Operation panel
⑨ Drawer
⑩ Base
⑪ Wheel
⑫ Handwheel

Fig.4-3. the structure chart of baby incubator

5 Products principle

5.1 The principle of the system of the constant temperature and the air convection circulation.

Baby Incubator body is divided into two stories. There are two rectangular holes on the baby compartment, then it will form air convection circulatory system from head to foot. The controller is equipped with the axle

flowing blower, heated tube and the water trough; the baby compartment is equipped with the hood, it is convenient to take down the crib. Under the driving of the axle flowing blower, the heat and moisture circulate along such a direction from top to bottom, from left to right in the baby incubator, then reach the balance of the temperature and the humidity. In the space of the axle flowing blower where the air pressure is negative, there is a hole having a diameter of 13 mm, from where a small amount of air outside enter the baby incubator after purifying, achieve the purpose that CO_2 does not exceed standard.

5.2 Principle of the circuit (see Fig.5-1)

DC voltage : Offer 5V voltage to the one-chip computer and integrated circuit, offer 9V voltage to the relay, buzzer.

Battery of 8.4 V : Act as alarm power when the main power is cut off.

Heat and control : Made up of IC of photoelectric coupling, BTA, and 400W heater.

Alarm : Be formed of a buzzer.

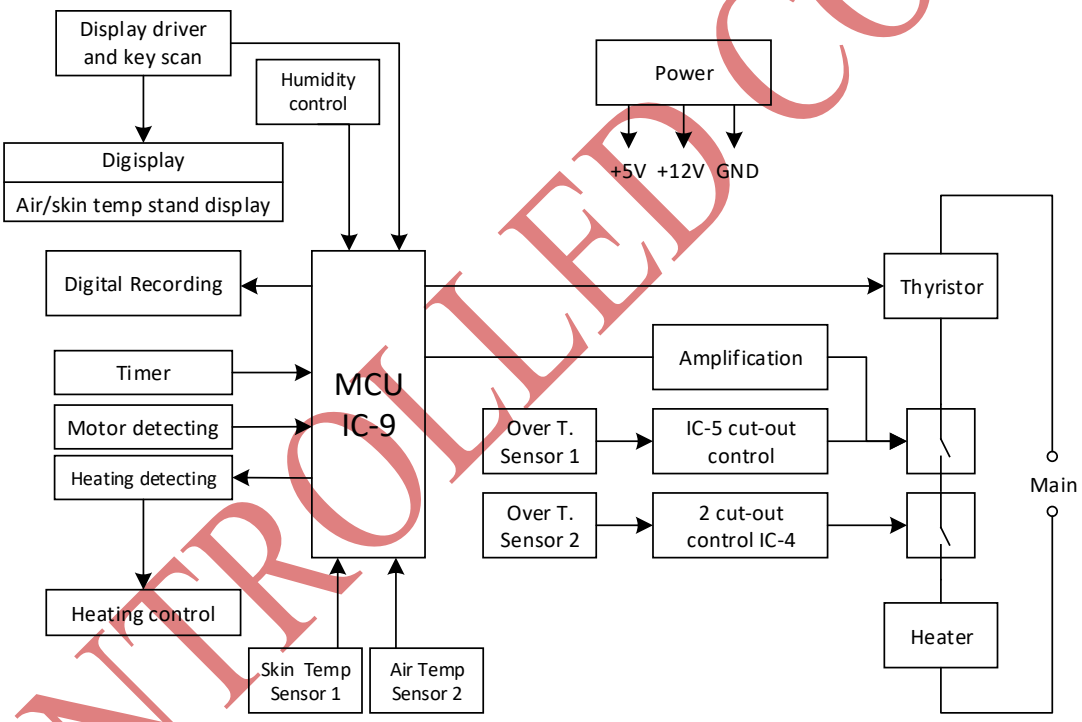


Fig.5-1 Principle picture of the hardware

5.3 Temperature control, show principle (see fig. 5-2)

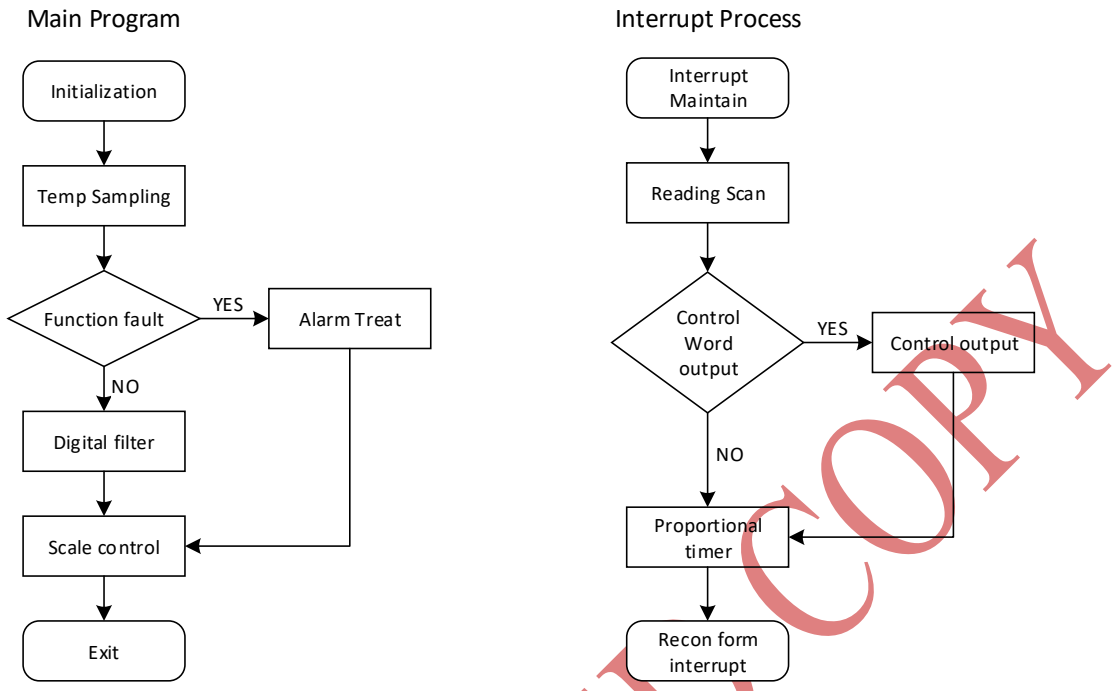


Fig.5-2 Procedure block diagram

5.4 The method to parameter revises (user, in a situation that the experimental condition does not possess, don't revise!)

5.4.1 Temperature revising

Press button of the incubator for seconds, the air temperature setting window shows "0--" and the first character glitters. Press the or button and press the SET button until the air temperature setting window shows "123" then press button again and the window will show "EP.- ". Press or button to select "EP.1", then press the key button and begin temperature revising.

At this time the air temperature setting window shows "p× ×" and glitters, at the station press or button to revise the disparity (max value ±2°C) between the air temp value and the value of point A of the incubator.

After above revising, press button again, at this time the skin temp display window shows "p××" and glitters, at the station press the skin temp's or button to revise the display disparity of the skin temperature.

5.4.2Humidity revising

Press humidity controls and keys at same time for several seconds, "RH set" window shows "-×", press RH or key, can revising the deviation of humidity("×" range: 0 ~ 9%).

6 Main technical parameter

6.1 Power Supply: AC 220~240V, 50Hz

6.2 Power consumption: ± 450 W

6.3 Operation environment conditions:

- **An ambient Temperature** : 20℃～ 30℃
- **An ambient Humidity** : 30%～ 75% RH
- **An ambient air pressure** : 700 hPa ～1060 hPa
- **An ambient air velocity** : < 0.3m/s

6.4 Humidity display range: 30% ~ 95%RH

Humidity control range : 30% ~ 95%RH (humidity set value should higher 10% then ambient humidity).

6.5 Control temperature range:

- **Air temperature :** 25℃～38℃
- **Skin temperature :** 32℃～38℃

6.6 The warm-up time : 45 - 75 minutes

6.7 The function of alarm :

6.7.1 The over temp of air temp : 38℃

(Heater is cut-out simultaneously, the thermal cut-out should be reset by manual)

6.7.2 The second thermal cut-out temperature: 40℃

(Heater is cut-out simultaneously, the thermal cut-out should be reset by manual)

6.7.3 The alarm for deviation:

- **Air temp:** ±3.0℃ (Heater is disconnected simultaneously at +3℃)
- **Skin temp :** ±1.0℃ (Heater is disconnected simultaneously at +1℃)

6.7.4 Alarm for Sensors:

When the skin (or air) temperature sensor is shut off or short circuit, cut off the heater, give out alarm with sound and light.

6.7.5 Alarm for power failure

The power fails, give out alarm with sound and light.

6.7.6 Alarm for fan failure

The fan stops working or appear fault, give out alarm with sound and light and cut off the heater power.

6.8 Carbon dioxide (CO_2)

level within the constant temperature cover <0.4%

6.9 Normal working, the whole equipment noise in the baby cabin ≤ 55dB(A)

6.10 Transport and storage

Environment temperature:-10℃~+70℃

Relative humidity ≤80%RH

Atmospheric pressure range: 500hPa~1060hpa

6.11 O2 control

Set range: 21~65%

Derivation alarm range : ±5%

6.12 Accuracy of skin surface temperature sensor: ± 0.3ºC

6.13 Accuracy of temperature control against set temperature: ± 0.8ºC

6.14 Uniformity of temperature on the mattress: ± 0.8 C

6.15 Adjustable cot tilt angle: ± 10 º

6.16 Mattress size: 630 mm (W) x 340 mm (W) x 23 mm (H)

6.17 Air Filter with filter ability to particle size: 0.5μm

6.18 Water Capacity for Humidifier: 1000 ml

6.19 Dimensions of the unit: 530 mm (W) x 990 mm (W) x 1490 mm (H)

6.20 Weight: 73.35 kg

Phototherapy

6.21 Panjang Gelombang : 420-490 nm

6.22 Total Bilirubin Irradiance (Jarak 36cm) : 2800μw/cm² (High)
2000μw/cm² (Mid)
800μw/cm² (Low)

6.23 Jumlah Total Lampu LED Cahaya Biru : 17 Biji

6.24 Akurasi Pengaturan Waktu : ± 1min per 12 jam

6.25 Pengaturan Timer Penghitung Waktu Mundur : 30 menit ~ 48 jam

6.26 Radiant Head Size : 382mm(L) x 230mm(W)

Baby Scale

6.27 Kisaran Berat : ≤ 12 kg

6.26 Akurasi Berat : 8g

6.27 Resolusi : 1g

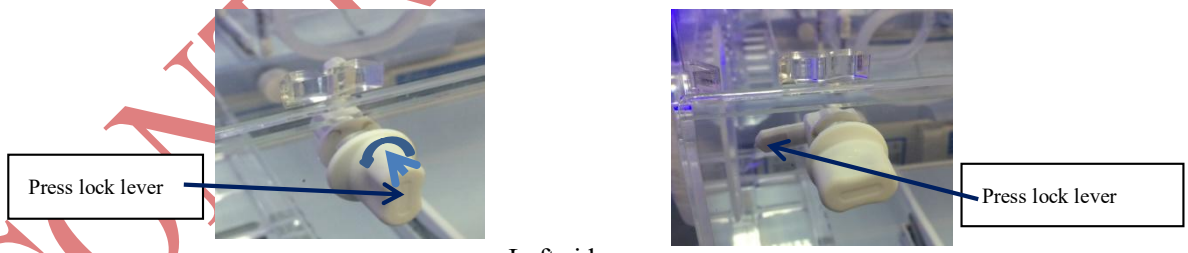
7 The function instructions

7.1 The handle of incubator

When need move baby incubator, pull or push it by the handle at the two side of incubator

7.2 The front door handle (as chart 7-1)

Pull front left handle of constant temp hood out and rotary, and then press operation window locking device, can open front door. When closed it, right locking device can self-lock, left handle should rotary and make it stuck locating slot located front door.



Left side

Right side

Chart 7-1 open front door operation

7.3 Oval operation windows

Chart 7-2 open oval operation window

There are operating windows at hood's front and back, so as two (or more than two) medical workers to go on with the baby through operation window. While opening the window, the medical worker only needs to press the lock organization with the finger, the window goalkeeper opened automatically.(as chart 7-2)

7.4 Rotate window (circle operation window)

There are circle operation window at the side, use for infusion or vent line. when use, first use one side of specified cloth cover put on the liner side of constant temp hood, the other side cover outer side (penetration the infusion or vent line, can not penetration also) ,then rotate the outer handle of cloth cover, make cloth cover ventage reduce to closed.

7.5 Support locking plate

When upward open the constant hood, the Support locking plate will limit the height of uplift, and have support effect. When closed it, must press support locking plate downward, constant temp hood will closed after self-locking bolt break away from limit.(as chart7-3)

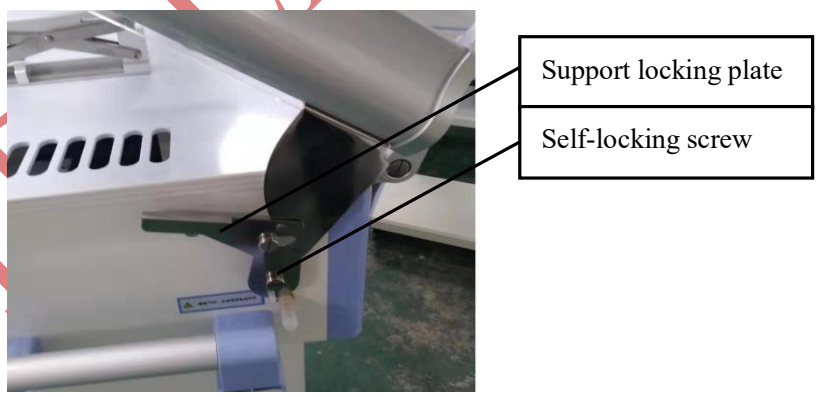


Chart 7-3 Closed constant temp hood

7.6 The sealed glue enclosing

Medical worker's hands feel comfortable while stretching into and operating in the window, play a sealed role after the window is shut off.

7.7 Water trough

Pull out water trough, add water to trough. (as chart 7-4).

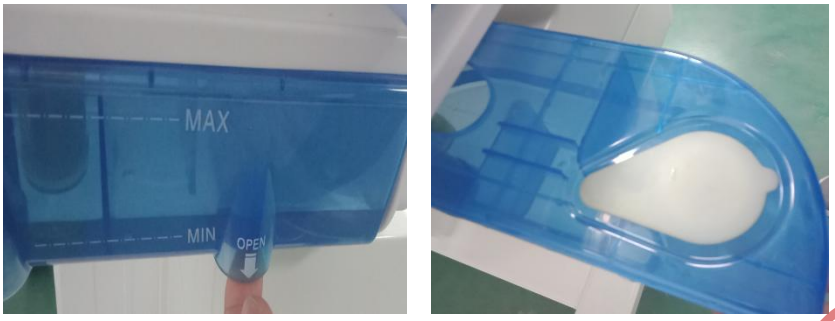


Chart 7-4 Open the water trough operation

7.8 Hook used for infusion

While needing for baby's infusion, used for hanging the infusion jar, the largest loading capacity is 20N.

7.9 Power switch

Power switch under the control box, switch on the power switch is the precondition to operate this incubator.

7.10 Controller switch

Controller switch is located in right side of control box, after switch on power, then switch on controller, incubator can work normally.

7.11 Aux output power socket

The Aux output power socket can offer electric energy for other auxiliary equipment. Max output power is 200VA.

7.12 Tray

For placement of nursing articles, the heaviest strength is 20N.

7.13 Phototherapy

Phototherapy is used for the treatment of neonatal hyperbilirubinemia.

7.14 Baby Scale

Is used to monitor the baby's weight accurately and continuously without having to remove the baby from the incubator, especially for premature babies or babies who need intensive care.

7.15 Control function of the panel

7.15.1 The part that displays the air control temperature

Show the air temperature and set up the air control temperature, if the indicator light is on; the incubator is on air temperature control mode.

7.15.2 The part that displays skin control temperature

Show baby's skin temperature and set up the skin control temperature, if the indicator is on, the equipment is on the skin temperature control mode.

7.15.3 The alarm part

Classify and point out various kinds of trouble with sound and light, press "audio paused" button, removes the sound (except alarm for power failure), sound alarm will auto return in 10 minutes.

7.15.4 The indicator of heated power

Point out the percentage of the heated power.

7.15.5 Timer

Can accumulate start time, press timer “reset” 5 seconds, accumulate timing start from zero.

7.15.6 The "key" button

When the indicator is on, lock the" set" button. Press the key, when the indicator puts out, then set up

7.15.7 The "alarm reset" button

Press the button, reset to the throne of the initial state.

7.15.8 The">37℃" button

Press the button, when the indicator is on, set up the control temperature greater than 37℃.

7.16 Distribution of the control function on the panel

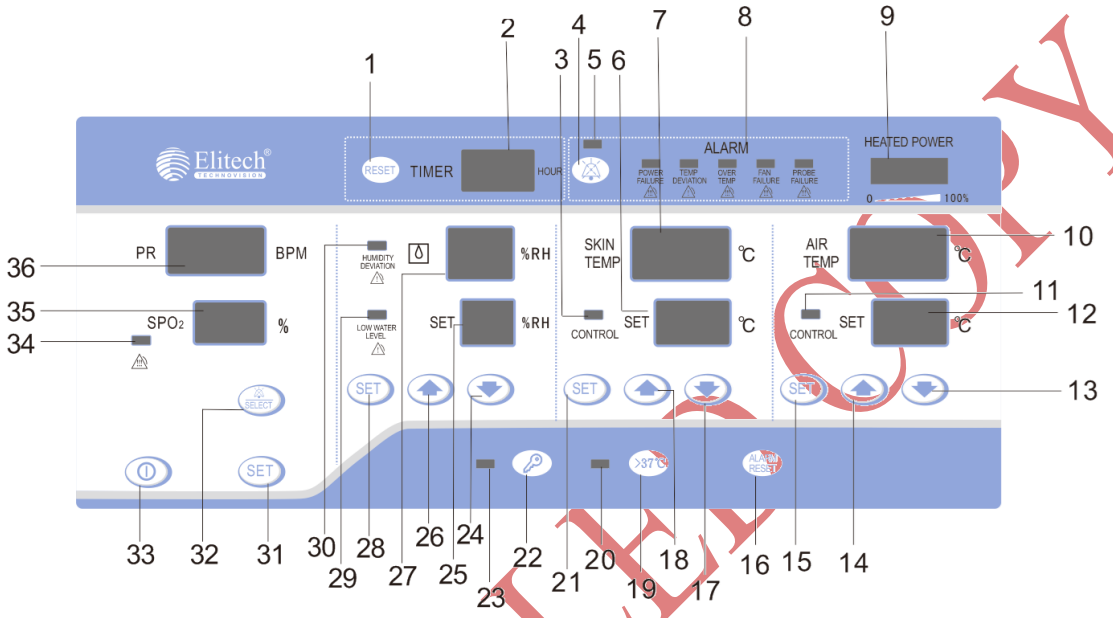
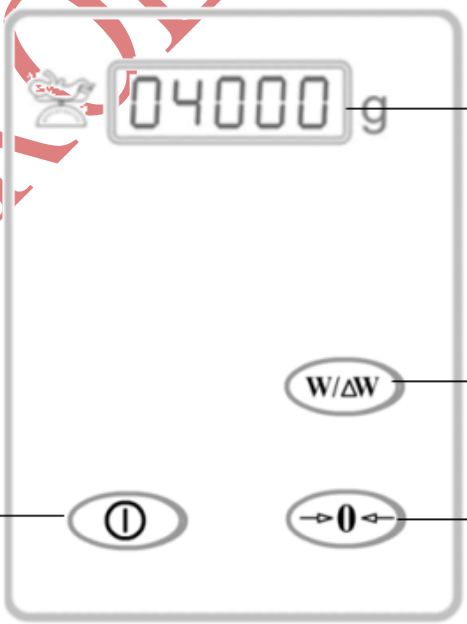


Chart 7-5 Control Panel



1. Timer reset key
2. Timer display
3. Skin temp control indicator light
4. Alarm audio paused key
5. Alarm audio paused indicator light
6. Skin temp set display screen
7. Skin temp display screen
8. Failure classification alarm indicator
9. Heating power indicator light
10. Air temp display screen
11. Air temp control indicator light
12. Air temp set display screen
13. Air temp set reduce key
14. Air temp set increase key
15. Air temp set key
16. Alarm reset key
17. Skin temp set decrease key
18. Skin temp set increase key
19.＞37℃ key
20.＞37℃ indicator light
21. Skin temp control set key
22. “key” button
23. “key” key display
24. Humidity set reduce key
25. Humidity set display
26. Humidity set increase key
27. Humidity display
28. Humidity set key
29. Low water level alarm indicator
30. Humidity deviation indicator
31. Set key
32. SpO_2 alarm paused key
33. SpO_2 switch key
34. SpO_2 alarm indication
35. SpO_2 display screen
36. PR display screen
37. Display
38. Measure/Increment
39. Tare
40. On/Off

7.17 Alarm system

7.17.1 Summary

For off a humidity and temp all well incubator for patient, during the use and maintain this equipment, if have failure will inform user in time, make them take effect action, reduce or avoid the damage to patient, equipment have 5 alarm state (Table7-1) as follows, divide into physiology alarm condition and technology alarm condition:

a) Physiology alarm state have : skin temp deviation alarm

b) Technology alarm state have: power failure alarm, sensor alarm, over temp alarm, fan alarm and air temp deviation alarm.

Alarm state		State description	Note
Power outage alarm		When equipment power is switch on, if have power outage, system will have at least 10 minutes audible an visual alarm, or still to power is normal.	Built-in battery alarm, press ”audio paused” can’t paused sound alarm
Deviation alarm	Air temp deviation alarm	Air temp control (require set temp at least higher than ambient temp 3℃),after temp stabilization, if test temp and set temp differ more ±3℃,incubator will have audible and visual alarm, remind operator take action. If higher 3℃,system auto cut off heating power.	Press “audio paused”, alarm will paused , it will auto reset

	Skin temp deviation alarm	Skin temp control, put skin temp sensor on the top of baby's abdomen ,set temp closed to baby skin temp, after temp stabilization, if test temp and set temp differ more ±1℃,incubator will have audible and visual alarm, remind operator take action. If higher 1℃,system auto cut off heating power.	alarm in 10 minutes, visual alarm can't stop
Sensor alarm		Air temp sensor appear open circuit or short circuit, equipment have audible and visual alarm, and cut off heating power.	
Fan alarm		No matter what circumstances, fan stop working or fan sensor system have failure, equipment auto have audible and visual alarm and cut off heating power.	
Over temp alarm		1）When air temp control mode, set temp at below 37℃, after temp stabilization, if appear temp reach 38℃, equipment will have audible and visual alarm and cut off heating power.	
		2）When air temp control mode, set temp at between 37℃～38℃, after temp stabilization, if appear temp reach 39.5℃, equipment will have audible and visual alarm and cut off heating power. 3) When skin temp control mode, set temp at between 32℃～38℃, after temp stabilization, if appear temp reach 39.5℃, equipment will have audible and visual alarm and cut off heating power.	Press" sound pause" not work, failure remove should start again then can reset normal state
Alarm state confirm summary		1. When equipment have "beeps" sound alarm, and the "outage" red indication light bright on the control plate, other digital display and indication all not bright, equipment into "power outage" alarm state.	Outage average alarm state delay 1 second, average alarm single have delay 1 second, operator at front of equipment in 1 meter
		2. When equipment have "beeps" continuous sound alarm, control plate except "sensor red indicator flash, other alarm indicator all not bright, air temp display screen show "Err",skin temp display screen normal, shows into "air sensor failure " state. 3. When equipment have "beeps" continuous sound alarm, control plate except "sensor red indicator flash, other alarm indicator all not bright, skin temp display screen show "Err"air temp display window is normal, shows into "skin temp sensor failure " state. 4. When equipment have "beeps" continuous sound alarm, control plate except "sensor red	Air temp max alarm state delay 3 second, max alarm sign have delay 1 second, air temp average alarm state delay 2 second, average alarm sign delay 1 second skin temp max alarm state delay 3 second, max alarm sign have delay 1 second, skin temp average alarm state delay 2 second, average alarm sign delay 1 second Operator at front of equipment in 1 meter.

	indicator flash, other alarm indicator all not bright, if skin temp display screen and air temp display screen all show “Err”, means into “skin temp sensor and air temp sensor failure “ state.	
	5. When equipment have “beeps” continuous sound alarm, control plate except “fan” red indicator flash, other alarm indicator all not bright, temperature display window and set window digital tube all not bright, shows into “fan failure “ state.	fan max alarm state delay 16 second, max alarm sign have delay 1 second, fan average alarm state delay 12 second, average alarm sign delay 1 second, operator at front of equipment in 1 meter.
	6. When equipment have “beeps” continuous sound alarm, control plate except “over temperature” red indicator flash, other alarm indicator all not bright, air temp display window shows high real temp value, equipment into “over temp” state.	Air temp over temp max alarm state delay 3 second, max alarm sign have delay 1 second, air temp over temp average alarm state delay 2 second, average alarm sign delay 1 second, skin temp over temp max alarm state delay 3 second, max alarm sign have delay 1 second, skin temp over temp average alarm state delay 2 second, average alarm sign delay 1 second Operator at front of equipment in 1 meter.
	7. When equipment have “beeps” continuous sound alarm, control plate except “deviation” yellow indicator flash, other alarm indicator all not bright, equipment into “deviation” alarm state. Air temp control mode alarm, range is differ ±3℃,skin temp control mode, range is differ±1℃,if corresponding display temp and set temp is positive value is positive deviation, otherwise is negative deviation.	Air temp deviation max alarm state delay 1.5 second, max alarm sign have delay 1 second, air temp deviation average alarm state delay 1 second, average alarm sign delay 1 second. Skin temp deviation max alarm state delay 1.5 second, max alarm sign have delay 1 second, skin temp deviation average alarm state delay 1 second, average alarm sign delay 1 second.

Table 7-1

7.15.2 Check the alarm system if normal or not

When re-installation incubator after disassembly parts for cleanout or maintain every time, user should inspected incubator alarm system, to see if normal or not, inspection way please reference part 8.

7.15.3 The priority of alarm state.

According to the standard and requirement of "IEC60601-1-8",alarm system of the equipment except must have visual alarm, need audio alarm too, to ensure patient safety.

Priority of incubator alarm state and sign (Table 7-2)

Alarm state	preferential	Visual alarm		Audio alarm	
		color	Flash rate （Hz）	Pulse count of a pulse crowd(Hz)	Interval of a pulse crowd（S）
Power failure	high	red	2	——	——
Over temp	high	red	2	10	7
Air temp and skin temp sensor failure	high	red	2	10	7
Fan fault	high	red	2	10	7
Temp deviation	low	yellow	Bright steady	2	18

The sound alarm indication of power failure alarm is different from other high-priority alarm, and its occurrence source is a separate buzzer

Table 7-2

8 Examination of the function

Every time when re-installation incubator after disassembly parts for cleanout or maintain, should inspection incubator function, ensure incubator normal work.

8.1 The inspection of alarming for power failure

Before the equipment plug insert in the AC power, turn on power switch of control, the indicator of "power failure" and audio and visual will alarm, turn off the switch of control, the alarm will be removed.

8.2 The examination to conversion of the air temp control mode and the skin temp control mode

After starting the machine, the instrument is under the air temperature control mode. When it is needed changing to the skin temperature control mode, press "key" button, press the skin temp "set" button. When the indicator of the skin temperature is bright, press "key" button for few minutes, the indicator of the skin temperature is from glittering to permanent bright, it is to enter the skin temp control mode.

If it is from skin temp control mode to the air temp control mode, the method is similar to above.

8.3 The alarm of skin temp sensor

Under the skin temperature control mode, pull out the skin temperature sensor, the equipment will give out alarm with sound and light, insert skin temperature sensor again, the equipment will return to the normal state.

8.4 The alarm of temp deviation

Set the air temp to 35℃, after temperature is constant, opened the equipment's front door, make the temperature of baby compartment drop, when it is lower than 32℃ ,the equipment will give out alarm with sound and light . Close the front door, after resuming in temperature, the alarm for temp deviation will be silent automatically.

When it is from air temp control mode to skin temp control mode, set the skin temp to 35℃.after the temp is

constant, put the skin temp sensor in the water of 34℃ and 36℃ separately, the equipment will give out alarm with sound and light, After resuming in temperature, the alarm for temp deviation will be audio pause automatically..

8.5 The alarm for over temp

Set the air temp to 35℃. Press the “key” button of the incubator for seconds, the air temperature setting window shows "0--" and the first character glitters. Press the “increase” (or “decrease”) button and press the “set” button until the air temperature setting window shows "123" then press the “key” button again and the window will show "EP.- ". Press the “increase” (or “decrease”) button to select "EP.4", press “key” button, air temp set show “OFF”, press air temp “increase” , show change to “ON”， then press the “key” button twice, it will enter the test state of over temperature (alarm indicator of over temp is slowly glitter). When the air temp rise to 38℃ in temperature, will have audio and visual alarm ,at the same time switch off the heated power automatically . after the temperature lower than 37℃, press the "reset" button, the state will be removed.

8.6 The alarm of the second cut-out temp

Set the air temp to 37.5℃ and make the controller in loss control state. When the air temp rise to 40℃ in temperature, the alarm of over temp will sound and light and turn off the heated power automatically. Restart it when the temp is lower than 37℃, Restart it ,the test state will be removed.

8.7 The alarm of fan failure

Let the fan stop working for 17 seconds, and then the alarm will sound and light and stop heating. And the alarm will be removed when the fan starts to work. (Don’t let the fan stop working for too much time, or the component will be damaged.)

9 Use of the equipment

9.1 Prepare before operating

9.1.1 Do well in the cleanness, disinfecting of the instrument.

9.1.2 Make sure brake wheels locked firmly, prevent it moving while working.

9.1.3 Insert the skin temperature sensor in the skin temperature sensor sockets.

9.1.4 Insert connector of the power cord in the equipment’s power input socket, the other plug in AC 220~240V, 50Hz socket (earth wire must be firm and reliable).

9.2 The operation method

9.2.1 Start the machine

Turn on the switch, then turn on control switch, the timer enters accumulating time state. This equipment control part enters self-check working state. Later, the instrument enters normal state:

a. When the indicator lamp for controlling air temp is on, the instrument in air temp control mode, and begin to heat or stop heating according to the temperature value set up, the instrument will show real-time temperature value at the air temp window. Skin temp display window show the real time temp of skin sensor, not controlled by skin temp set.

b. When the instrument is in skin temp control mode, the indicator lamp for controlling skin temp is on. And begin to heat or stop heating according to the skin temperature value set up, the equipment will show real-time temperature value at the skin temp window. Air temp display window show real time air temp, not controlled by air temp set.

9.2.2 The conversion of the air temp control mode and the skin temp control mode

According to the need of the clinical, under the air temp control mode, when it is needed to change to the skin temperature control mode, please do as follows:

a) Press the " key " button; remove the locking of the "set " button

b) Press the skin temp "set" button, the controlling indicator lamp will be glittering, and change to permanent bright after several seconds, the instrument has been in skin temp control mode at this moment.

According to the clinical need, when changing from skin temp control mode to air temp control mode, can operate as follows:

a. Press the " key "button, remove the locking of the "set" button.

b. Press the air temp "set " button, the controlling indicator lamp will be glittering, and change to permanent bright after the several seconds, the instrument has been in skin temp control mode at this moment.

9.2.3 The setting up of the air temp and the skin temp

On the air temp control mode or the skin temp control mode, according to clinical need or doctor's order, if wanting to change the control temperature value, can operate as follows:

a. Press the "key" button, removes the lock of the "set" button.

b. Press the "increase" button or the "reduce" button to set the temperature value; at foundation of 37℃, press the "＞37℃" button (after the indicator is on), then press the "increase" button or the "reduce" button to set the control temperature value greater than 37℃.

9.2.4 The usage of humidity adjustment

a) If need incubator work with (water trough) no water state, must turn off the humidity switch, and monitoring strictly the air humidity of incubator, avoid make baby or equipment get hurt.

b) The operation of replenish water

first, pull out the water trough slowly, take out it,make the cover in upward, take off the cover by rotating the cover of water trough in contrarotate , inject distilled water leave 1cm between the water level to the cover of water trough, tighten the cover by rotating it with clockwise,put water trough on the support, press it make user it totally in water trough support and pull it in slideway slowly, after it in right place,the slideway can lock by itself.

c) Humidity control operation

When use humidity adjustor, must add distilled water and check the low water level alarm indicator and real water level, avoid make baby or equipment get hurt

Press  button, turn on the humidistat, according to the need of the clinical and the set value, press  （or  ）button several seconds, the set value become change, until the needed value appear, the humidity value set is OK. Then the humidity in the incubator will be keep around the set value, the humidity display screen will show the real-time relative humidity value.(see Fig 9-1)

Attention: The humidity value is set to be greater than 10% RH ambient humidity. If the humidity is lower or 15% higher than the set humidity value, the device will emit an alarm with a sound and a light indicator.

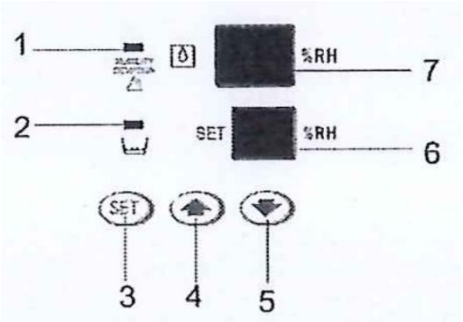


Fig 9-1. Control panel *(humidity)*

1. Humidity deviation indicator
2. Low water level alarm indicator
3. Humidity set key
4. Humidity set increase key
5. Humidity set reduce key
6. Humidity set display
7. Show humidity when using humidity adjustment, must add distilled water and check the alarm to prevent the baby or equipment from failing.

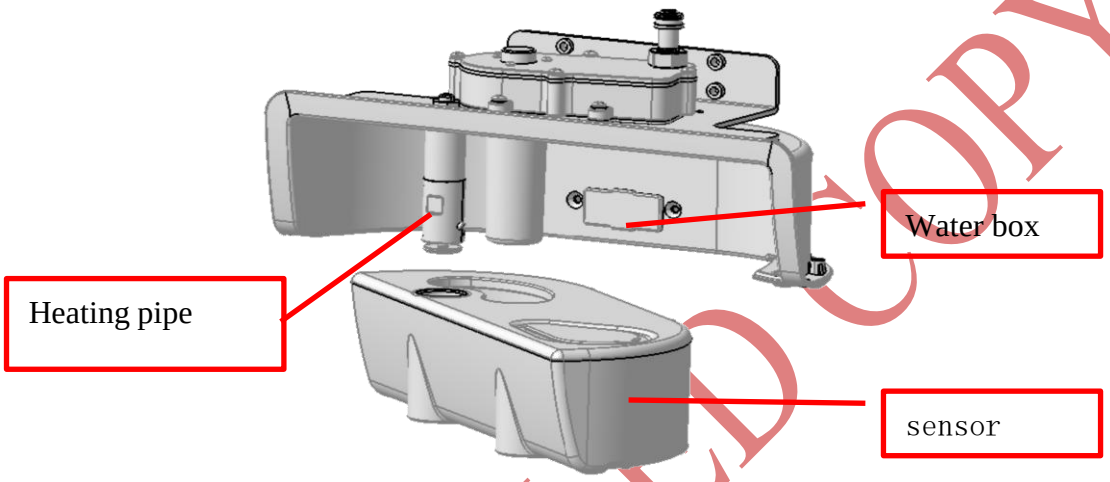


Fig 9-2. Humidity system

9.2.5 SpO_2 monitor（including SpO_2 and PR two function）

1、SpO2 technical parameter

Measure range：0%~100%

Resolution ratio:1%

Precision：70%~100%：±2%

0%~69%：Undefined

Alarm range：0%~100%

2、PR technical parameter

Measure range：0 bpm ~ 250 bpm

Resolution ratio：1 bpm

Precision：±2bpm

Alarm range：0~254 bpm

3. Audible and visual alarm/Reminder parameter

Alarm audible type：buzzer

Alarm visual display type: panel alone LED light

Alarm set range：

SpO_2 high limited 95~100%

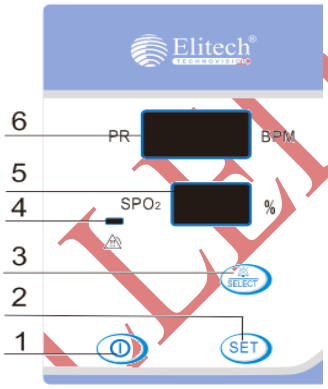
SpO_2 low limited 80~96%

PR high limited 80~250 bpm

PR low limited 40~100 bpm

Alarm /Reminder set: SpO_2 high limited/low limited, PR high limited/low limited, SpO_2 alarm switch ,PR alarm switch, Sensor alarm switch, pulse sound switch.

4. SpO_2 LED display panel



1.SpO_2 witch key　　2. Set key　　3. SpO_2 alarm paused key

4. SpO_2 alarm indication　　5. SpO_2 display screen　　6. PR display screen

Fig 9-3. Control panel PR*(SPO₂)*

5. Operation instruction

After switch on the equipment,SpO_2 in off state,put switch key to turn on SpO_2 function, PR display window show pulse value, SpO2 display window show blood oxygen value, if want to switch off SpO2 panel press switch key again.

When not connecting sensor or finger inserting abnormal,PR display window will show “E--”, SpO2 display window will show “---”, at same time will audible and visual alarm.

When the display value of PR or SpO2 over alarm set range,correspond display window value flash,and with sound alarm.

When have alarm,press select key can turn off sound alarm, after arrived set time the reminder sound can recover auto or by manual. Set operation see the set item.

Press set key long time can enter into set menu,PR display window show set value, SpO_2 display window show set item.

Attention: every set item all can turn off by pressing switch key.

Set item:

P.- ： Set item waiting for selection state.

Operation way:press set key long time function: press choice key choice set item, set key enter into set every item.

P.0: Alarm paused recovery time:1,2,3,5,10,0　　1,2,3 show auto recovery sound time, 0 show manual recovery time.

Operation way: set key for affirm, choice key for choice(same as follows)

P.1: SpO_2 high limited , set range 95~100%.

P.2: SpO_2 low limited , set range 80~96%.

P.3 :PR high limited， set range 80~250bpm

P.4 :PR low limited， set range 40~100 bpm

P.5 :PR alarm enable sign,set range （0,1）,0 show forbidden,1 show enable,same as follows.

P.6 :SpO_2 alarm enable sign ,set range（0,1）

P.7 :PR beat sound enable sign,set range（0,1）

P.8 :Sensor abnormal alarm enable sign, set range（0,1）

P.9 : Finger insert abnormal alarm enable sign,set range（0,1）

P.A :Restore factory settings， set range（0,1）

factory settings:

PR alarm high limited 110 ,PR alarm low limited 50, SpO_2 high limited 99%, SpO_2 low limited 80%

PR alarm enable,SpO_2 alarm enable, PR beat sound enable, Sensor abnormal alarm enable, Finger insert abnormal alarm enable ,Alarm paused recovery time all is 0 (manual recovery)

9.2.6 installation and use guide of O_2 control

9.2.6.1 Main technical parameter

Display range	: 0-100%
Measurement accuracy	: ±2%
Set range	: 21%~60%
Control accuracy	: ±4%
Device alarm range	: ±5%

9.2.6.2 O_2 control system Summary

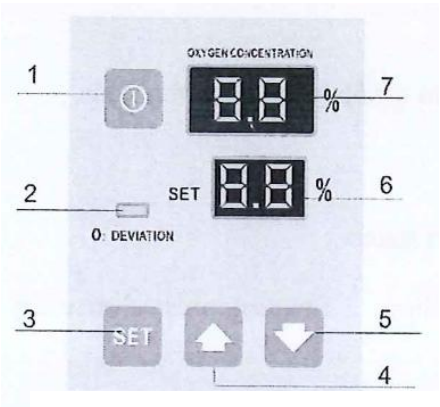
Oxygen control system offer the function of control oxygen concentration. It is formed by two depended oxygen concentration sensor and control circuit, this system oxygen concentration range is 0-100%,set range is 21-65%

9.2.6.3 Operation of oxygen therapy

1. First, insert one side of silicone tube to left side port of incubator control cabinet, the other side insert oxygen therapy equipment port with flow measure.

2. Press  key, switch on the oxygen control,set the value as the clinic needed. Press  key,and press  (or )key, adjust the value of oxygen concentration change to needed value, it is finished.

Equipment will auto control the oxygen valve to open or close according to the set value of oxygen concentration, make the oxygen concentration in incubator keep at the near to the set value, oxygen concentration display window will display the value of oxygen concentration.(see Figure 9-4)



1. O_2 key button
2. O_2 deviation indicator
3. Set key
4. O_2 set increase key
5. O_2 set reduce key
6. O_2 set screen display
7. O_2 concentration screen display

Fig 9-4. Control panel Oxygen set

9.2.6.4 Installation and replace of oxygen sensor

As Figure 9- 5 press the sensor box two side flexure strip, meantime pull out the sensor box, as Figure 9-6 open sensor cover by screw, get out sensor cover. As Figure 9-7 twist two sensors into the sensor cover as clockwise. As Figure 9-8 get out the sensor cable from sensor box and separately connect two sensors and back to sensor box, fixed it with screw, then push sensor box into the consistent temp hood.

Replace sensor please reference above method operation.

Fig 9-5

Fig 9-6

Fig 9-7

Fig 9-8

9.2.6.5 Oxygen concentration operation

a) Press ⏻ button to turn on the monitor, then the screen will display the real-time oxygen concentration.

b) Operation of calibration: To ensure the accuracy of measurement, periodical calibration operation is needed. Calibration operation includes regular calibration of concentration (21%) Normally the former is needed every 3 months and the later is needed every year. For the regular calibration of concentration, we only need to fill the oxygen sensor with ordinary air and while for the calibration of pure oxygen, we need to inlet pure medical oxygen through oxygen sensor.

Take the following operation of the regular calibration of concentration for example:

When incubator in working state, get out sensor box, put the calibration device that with oxygen connect cable on the downside of sensor box. Press SET key 2 second,display shows“ --- ”. Press the “INCREASE”(REDUCE key moving to right) to make the screen display “123”. Then press SET, the screen will show “C0-“. Then press the “INCREASE” button for a couple of times and the screen displays in a sequence“C01”, “C02”, “C03, “C01”……. (Choose the “C01” to enter the regular calibration of concentration(21%). Choose “C03” to resume to default setting.) choice CO4 as oxygen concentration sensor 2 normal concentration (21%) calibration, choice CO5,then is oxygen control sensor 2 100% concentration calibration. Choice CO6 check the oxygen sensor measurement.

After choosing “C01”, press SET and the screen will show “0”(If pressing SET button at this time, the operation of calibration will be stopped) . Then press the “INCREASE” button and the screen will display “1”. Press SET to confirm the operation. The equipment will calibrate automatically. When the figure on the screen is gradually close to “021” and the figure”021” can display steadily for one second on the screen and the screen can show “C0-“ automatically again， Press SET again to save the result and exit the actions.

c) operation of oxygen concentration.:According to the ruler of treatment, switch on ,press SET key,(digital

tube SET window flash) press INCREASE OR REDUCE key, change oxygen control set value. Then press SET key return or delay some seconds auto return. Now, oxygen control system into control working state.

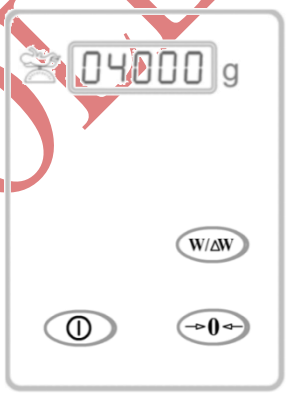
9.2.6.6 Resolve oxygen control failure

The lifespan of oxygen sensor exposed to the air is about 5 years. When the reading error for oxygen concentration is too large, it is necessary to replace the oxygen sensor. You can use the portable oxygen monitor to measure and contrast to ensure whether the lifespan reaches the end. To replace the oxygen sensor, you need to open the main panel of the baby incubator. Then disconnect the plug of the oxygen sensor. Rotate counterclockwise and screw off and replace the old oxygen sensor.

Oxygen control system some failure and solution way.

Failure	Reason	Solution
Oxygen display shows Err	Oxygen sensor not connect or cable is break	Check oxygen sensor install if normal, cable if well.
Red light flash	Oxygen sensor measurement value and set value device big, window not closed	Check the sensor state is right or wrong, calibration sensor again, adjust oxygen gas flow, check window, rotate window
Can't calibration	Oxygen sensor not connect or cable is break	Check sensor installation is normal ,cable if well or not.

9.2.7 Use on Baby Scale



1)、 "On/Off" button

After turning on the power, press this button and the baby scale will start working. In the working state, press this button once, the baby scale will stop working and return to the standby state.

2) W/ΔW "Measure/Increment" key

In normal measurement status, press this key once to display the weight increment; press this key again to return to measurement status.

3) 0 "Tare" button

In normal measurement status, press this key to perform tare operation.

5 Symbol and beep definitions

1)Symbol

 Prompt after pressing key once for special operation

 Prompt after pressing key twice for special operation

 Prompt after pressing the key three times for a special operation

 Weight increment "base value" setting tips

 Tips for completing the setting of the "basic value" of weight increment

 Overweight tips

 Scale plug and its open circuit fault prompt

2)Beep

“Beep” The key sound indicates that the key is turned on;

“Beep---beep------” Prompt for power on and ready for work;

“Beep----------” End of work reminder;

“Beep---beep------、beep---beep------ ……” The scale output plug is not connected, there is an overweight prompt, or there are prompts such as taring and clearing multiple times.

6、Specific operating instructions

1)Turn on the baby scale

After the baby scale is powered on,click ⏻ key，The device makes a "beep---beep----" sound, the baby scale starts self-checking, and the display window shows

At this time, you can observe whether the digital tube displays broken codes to ensure that the digital display is normal. Then the company’s English name is displayed

Then the weighing measurement value will flash and display; when the weighing measurement value is displayed stably, the scale will enter the weighing state.

To end the measurement,click ⏻ button to turn off the baby scale and enter standby mode.

2)Weight measurement and weight gain observation operations

The baby scale is in the "measurement" state,click W/ΔW key，It will turn to the "increment" state, you will hear the sound of "beep--beep-------", and the number in the display window flashes. This number is the increase in the baby's weight.

In this state, press the key again to return to the "measurement" state.

When observing "increment", the "basic" value must be set in advance, and it is only meaningful to observe the "increment" value on this basis.

For example: the baby has just been placed on the scale and is in the measurement state, click W/ΔW key，

Enter the incremental display state, then click →0←， window display

Press again →0←， window display

Then you hear a "beep---------", indicating that the "basic value" setting is completed and the scale enters the normal weight measurement state.Click now W/ΔW key，The display window flashes "0"g, which is the real-time increase in the baby's weight.

3)Tare subtraction operation

a、Lift and tare the baby in the incubator

When the baby needs to be tared in the incubator, the following operations can be performed:

In the measurement state,click →0← key，window display

And heard the sound of "beep--beep-------",Tips can hold the baby.At this time, open the front door of the incubator, handle the baby (remove unnecessary items such as diaper pads), and lift the baby up. When you hear a "beep---------" prompt, Indicates that the tare weight removal operation is completed.（The default value of this baby scale is 1kg, that is, the baby's weight must be greater than 1kg for automatic tareing to be effective.），

You can put the baby down and the window will display

After putting the baby down, the "net weight" value of the baby is displayed in the measurement window.

b、Tare before putting baby down

When the baby needs to be tared before it is placed in the incubator, you can perform the following operations:

In measurement mode, press →0← key, window display

And heard the sound of "beep--beep-------",press again →0← key, window display

press again →0← key, window display

After hearing a "beep---------" prompt, the window will display

The skinning operation is completed before placing the baby.

That is, press three times in a row →0←, Then you can complete the peeling operation before putting the baby. If the display window does not show "0" after the tare subtraction operation, the above tare weight subtraction process can be repeated again.

7、Notice

1) When using the baby scale, it must be stable in the environment (in the baby incubator or on the infant radiant warmer) for more than 30 minutes before weighing and taring operations to ensure that the baby scale is consistent with the ambient temperature and reduce symmetrical temperature changes. severe effects (especially during temperature changes);

2) When the baby scale is in normal use, you should put the baby down gently and do not use force on the scale when lifting the baby to avoid damaging the weighing sensor;

3) Baby scales are affected by various factors. During normal weighing, the numbers may occasionally jump up and down, but they will not exceed the accuracy range and will not affect the weighing results.

4) After the tare operation, sometimes "1" is displayed instead of "0". Don't pay attention to it at this time, because it is within the error range; of course, you can also perform the tare operation again so that it displays "0";

5) If the scale plug is unplugged or connected while the scale is on, an open circuit alarm will appear on the scale. After the alarm is stopped, the tare weight removal operation should be performed again so that the scale can work

normally.

6) When weighing, the baby scale must be stable in the operating temperature environment (at least stable for more than 30 minutes) to ensure that the temperature of the electronic components inside the scale is consistent with the ambient temperature, and to minimize the impact of temperature changes on weighing accuracy;

7) When used in an infant incubator or on an infant radiant warming table, be sure to adjust the crib to a horizontal position to reduce measurement errors;

8) If the scale is to be cleaned and disinfected, wipe it with a wrung-out damp cloth. Do not allow water or disinfectant to enter the inside of the scale to avoid damage to the internal circuit of the scale.

9) The baby scale does not need to be taken out and stored for a long time. It must be placed flat when stored. Do not place anything on the scale to prevent the sensor from being stressed and fatigued for a long time, thus affecting the measurement accuracy;

10）If there is an abnormality in the scale, professional technicians should inspect and repair it according to the requirements and steps in the maintenance manual. You can also contact the dealer to solve the problem.

11）Taboo: It is strictly prohibited to weigh babies or children weighing more than 12Kg!

9.2.8 Deal with the alarm

When appearing the unusual situation or the instrument breaks down, the controller will classify and give out sound and light alarm automatically, cut off the heater power at the same time. Press “audio pause” button to make the alarm audio paused, and then check out the cause and remove it, the instrument will return to the normal state again (when alarming for over temp, must press "reset" button to let the instrument work again).

9.2.9 Usage of timer

Turn on the main power of incubator, timer enters timing state, direct display the time of use this equipment this time. Press “reset” key of timer, display accumulate time of use this incubator; if press it continue few seconds, timer will start accumulate timing from zero.

10 Warning

10.1 The incubator **is not** CATEGORY AP/APG EQUIPMENT. If user use oxygen therapy device, please do pay special attention to:

-- An oxygen analyzer shall be used when oxygen is delivered to the baby and suggest use oxygen therapy hood. Please consult oxygen analysis equipment operation instructions and the similar file to operate.

-- The use of oxygen increases the danger of fire and that auxiliary equipment producing sparks shall not be placed in the incubator.

-- Even small quantities of flammable agents; such as ether and alcohol, left in the incubator can cause fire in connection with oxygen.

-- Administration of oxygen may increase the noise level for the baby within the incubator.

10.2 The AC power must be single-phase and three wires, the earth wire must be reliable. The incubator should be put in the clean, temp and humidity having a small change workplace.

10.3 Direct sunlight or other radiant heat sources can cause an increase in INCUBATOR temperature to dangerous levels.

10.4 The incubator is CLASS I and TYPE BF APPLIED PART EQUIPMENT. Particular care must be taken to ensure that additional equipment connected to the baby is electrically safe. That link with baby is set up must be grounded additionally it is reliable or insulating.

10.5 The mode of operation of the equipment is CONTINUOUS OPERATION.

10.6 The skin sensor can't serve as rectum temperature sensor.

10.7 When the instrument is on skin temp control mode, can't put the skin temp sensor to the outside of the incubator.

10.8 Must hold the plug correctly, while pulling or inserting, forbid pulling the skin temp sensor’s wire with hand.

10.9 Don' t put or use the material that will produce the harmful gas or the dust in the compartment.

10.10 Incubator power aux output socket rated output AC is 220~240V 200VA, when connect other device, the rated power can’t over 200VA

10.11 When a certain function of the equipment is lost or breaks down, must shut down in time, and ask the full-time attendant or maintenance personal of our company to carry on maintenance immediately.

10.12 To avoid the risk of electric shock,this equipment must only be connected to a supply mains with protective earth

10.13 No modification of this equipment is allowed.

11 Precautions

11.1 An incubator should be used only by appropriately trained personnel and under the direction of qualified medical personnel familiar with currently known risks and benefits of incubator use. That must read "manual" carefully before using the machine.

11.2 When starting the machine, must set the temperature value firstly, and can use after preheating for 60 minutes.

11.3 Although there is the low water level alarm, you should observe the caution light and height of water level of water trough frequently, don't let water trough lack water.

11.4 If the power fails, don’t turn on the switch for a long time, other else the alarm for power failure will sound and this will waste the battery.

11.5 Forbid blocking the entering vent and the exporting vent.
11.6 The environment temperature of the incubator is 20℃~ 30℃ and the humidity is 30% ~75%RH, when the condition is not arriving the demands, please don't use.
11.7 Must lock the foot wheels firmly while using to prevent the equipment moving.
11.8 The incubator adopts the Model fuses of F3AL250Vand F2AL. When changing it must pull out the plug
11.9 Check and wash the air clarifying filter cloth in time, avoid blocking the air vent and increasing the density of the carbon dioxide of baby's cabin.
11.10 Mustn't scrub the Lucite of the hood with organic solvent such as alcohol, don't let the hood in ultraviolet radiation either.
11.11 The things in incubator can't over its volume; total weight can't over 100 N.
Baby bed tray load: baby bed patient and things total weight can't over 100 N.
11.12 When use humidity device, the water in water tank volatilization soon, should check the level of water in the tank in time, avoid humidity too much or lack of water, if lack of water in tank may damage the humidity part.
11.13 When the instrument is abnormal don't use reluctantly, use after professional personnel find out the reason and solve it.
11.14 The control circuit of the incubator is connected with the relay, there will be micro- electromagnetic radiation when the relay moves, while using other auxiliary equipment, propose adopting good earth wire and shielding measure.
11.15 Before pull water to the tank, should switch off the adjustment of humidity or power, after about 2 minutes, pull out tank 15cm with continuous and stable, water tank should add distilled water, when reach H level, push in it in suitable continuous slowly, avoid distilled water spilled.
Attention: this equipment not has reduced humidity function! When ambient humidity is over 75%RH, please don't use.
11.16 This equipment service life is 8 years, when service life is over should scrap the equipment, related products scrap should be in conformity with law.

12 Wash and Maintenance

12.1 Wash

Whenever finish one babies cultivate, must wash, sterilization and disinfect the incubator completely (at least one time every week when using)
First, dip all incubator parts into sterilization solution. Next, rinse them with sterilized, clean and warm water. And then dry them completely. Finally wipe off moisture by the use of a soft cloth. Use disassembly methods of each part for cleaning and sterilization. Comply with the following methods for incubator cleaning and sterilization.

◎ 0.2～0.5％ Benzalkonium chloride solution
◎ 0.2～0.5％ Benzethonium chloride solution
◎ 0.02～0.05% Chlorhexidine solution

CAUTION: It is strictly prohibited to use alcohol for cleaning and sterilization. Undiluted solutions should not be used even though they are earlier mentioned. If the solution is to be used for sterilization, the above mentioned solutions should be diluted for use.

12.1.1 Wash of crib

Raise constant temperature cover, with support horn to make the constant temperature hood put on slope, then lift the crib, and taking out along the track.

Wash all crib surfaces completely with the sanitizer, and then dry with the clean cloth; the mattress is removed, and covers again after changing, cleaning and drying.

12.1.2 Wash of bed layer board and air circulation

Take out the bed layer board, clean it surface with sanitizer. Then wash the trough bracket, heat tube, air temp sensor (wipe the surface lightly), axle flow wind leaf, enters draught wash and the air circulation surface, then dry with the clean cloth.

Due to high temperature, wash of heater could begin at least 45 minutes after turn off the machine to avoid burnt.

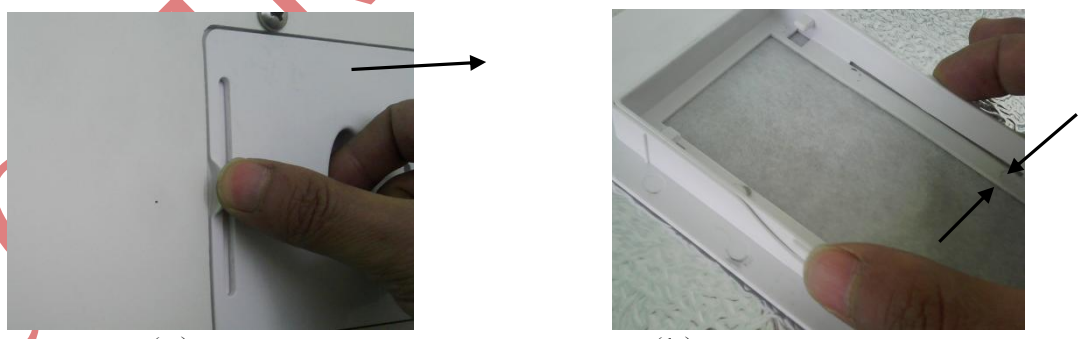
12.1.3 Wash of the fluid sealant circle

Take down fluid sealant enclose from the hood, wash with cleaner and dry it.

12.1.4 Wash and change of the air clarifying filters

Must use the special filter cloth otherwise it can not reach the air filter effects or may cause exceeding of CO_2 concentration in incubator

Press the lock switch above on the cover of air filter box, push right to open this cover board which on the back of incubator. Extrude air filter cloth fixed platen from outside to remove the filter cloth. Clean air purifying device with sanitize then dry it with clean cloth. Wash air filter cloth. There will be wrinkle and damaged phenomena, when the filter cloth wash too much times, change the filter the cloth in time. Snap one side of cover into air filter box, press another side into box then finish the process.



（a） （b）

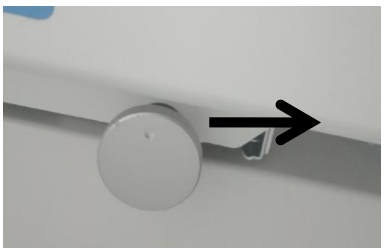
Fig 12-1 Open air filter box to operate

12.1.5 Wash of the skin temp sensor

The sanitizer washes the surface completely; dry with the clean cloth by disinfecting

12.1.6 Wash of water trough

12.1.6.1 Turn the lock knob of the drawer (located at the back of the drawer) to the unlocking place, and then push the drawer forward;



Rotate the drawer lock

Push the drawer forward

12.1.6.2 Hold the water box with your hand. Press the button under the water box with your finger to take the water box;

Hold the water box and press the button under the water box

Open the top of the water box

12.1.6.3 Reset the water box after cleaning and disinfection;

When the water box is installed, just aim the water box at the fixed column of the water box, and then push up, hear the sound of "knocking", the water box is installed in place.

12.1.7 Wash of hood and the foot wheel

Wash all surfaces completely with the sanitizer, including corner and border on the door, and then wipe with the soft cloth lightly. Don't scrub the constant temperature to cover with organic solvents, such as alcohol, etc. Don't let the hood in ultraviolet direct radiation.

□Cleaning of air outlet and inlet guardrail

Remove the guard rail

The guardrail is slightly lifted upwards, and the guardrail fixing screw corresponds to the big end of the guardrail calabash hole, that is, the guardrail can be removed, and the corresponding hole and the fixing screw on the constant-temperature cover can be moved downwards after cleaning, so that the guardrail can be installed and completed.

□Hanging window cleaning

Remove the moving ring

Remove the window rubber band

Remove the fixed ring

Remove the hanging window sheath and moving ring and then remove the hanging window rubber band. Remove the fixed ring and install the reset device after cleaning.

Note: when installing the rubber band of the hanging window, it must be installed in place. Force to rotate the fixing ring. If the fixing ring does not fall off, it means the rubber band is installed in place，the rubber band can not be locally raised after installation.

Install the window rubber band

Install moving ring and sheath

Diagram of hanging window installation

12.2 Disinfection

Compared with irradiation sterilization and steam sterilization, gas sterilization method is much more suitable for baby incubator. Sterilization time and temperature depend on the parts of the material to be disinfected and the final process.

Gas sterilization

a) Clear up the contaminated material inside of incubator;

b) To maintain open state for thermostat cover and operating window;

c) Start gas sterilization;

d) Close the thermostat cover and operating window,

e) After dried, keep the incubator that without baby inside working properly

f) Set temperature as 37℃ to disinfection for at least three hours. Operating time depend on the gas to be sterilized and disinfection equipment.

Note: Steam sterilization could not use for sensor head!

12.3 Maintenance

⚠	**Need professional personnel to maintain. While maintain, must pull out the power plug**

12.3.1 The change of the battery

In the process of examining the alarm of power failure, if the alarm can not sound, or the sound is too small, charge the battery up or change a new one in time in case that the battery liquid flow out and damage the parts of the equipment. When changing the battery, first, put out power cord, and then lift the organic glass constant temp hood, put constant temp hood slope with support lock plate, and then uplift the baby bed, pull out it from front by the tracking. Take out the bed layer board, press one side make it cock, take out the baffle plate, rechargeable battery located in the max big circuit(see the chart in left), take out it, change type is B80H5A2H 8.4 V one, new battery weld it on the circuit as the right polarity. Old battery doesn't throw it away at will, avoid polluting the environment.

If the equipment hasn't been used over six months, start the machine to make it charge automatically at least 6 hours, insuring the sufficiency of power to alarm for power failure.

12.3.2 The change of the fuse.

The change of the fuses

While changing the fuse, pull the plug out of input socket in power socket board which is on the right of control box, after pulling out the fuse board from bottom, lift two fuses in order with a little screwdriver to find out the burnt fuse , then change with a new one (F3AL250V φ5×20mm).pull fuse in right place.

While changing the transformer fuse - Unscrew the fuse cover which is under the control box, and change the new fuse with F2AL250V, φ5×20mm.

Under normal condition, regular maintenance should be done for each three month.

13 The removing of the common troubles

Trouble phenomenon	Reason analysis	Method of dealing with
Alarm for power failure	1.Outlet keep in touch kind 2.The power fuse fuses 3.The electric wire netting cuts out	1. Repair or change outlet 2. Change the fuse 3. Close the switch
Alarm for over temp	1. The damage of the temp sensor	1.Change the temp sensor
Alarm for temp deviation	1. Start the machine temperature on the low side 2.In the case just, constant temperature put on the front door turn on time too long 3.Under warm higher situation of the case, set up lower temperature	1.Reset, wait 2.Close the door, reset and wait 3.Reset, wait
Alarm for sensor failure	1.Not insert the skin temp sensor 2.Has been inserted. The sensor plug comes off or connection bad 3. Sensor is damaged	1. Insert it 2.Check the plug and the connection. 3. Change the sensor
Set key operation loss control	Key connect not good or damage	Check the key button and dear with it
The display screen of temperature is not bright	Sensor not insert or open circuit	Check sensor and connect it well
Humidity temp can't rise	1. water in tank too few 2. humidity heat tube failure 3. humidity already balance	1. add enough distilled water in tank 2. check the heat tube, remove the failure 3. adjust humidity rotary knob
The heater indicator is on, but temp has not been rising all the time	1. The heater is damaged 2. Relay connect not well	1. Change the heater 2. Change relay

Table 13-1. Common troubles

14 After-sale service

Dear Users:

Thank you for using the medical equipment products that made by our company; please keep this maintenance properly. Products such as defective in quality or breaking down will go on guarantee or maintenance by this list.

The list of maintenance

Name: Infant Incubator		Model: BB-200	
Date of production:	Date of purchasing machine:		Type:
Applying company:			Postcode:
Address:			Tel:
Suggestion of applying company	Date:		
Handling suggestion	Date:		

The medical equipment products which our company produced, guarantee in two year, and maintain all its life (except being damaged artificially), if the products can not reach technical indicator or other quality problems, please send "The list of maintenance" to the service department after sale of our company to solve according to the regulation.

15 Follow-up

Dear users:

The manual is suitable for the incubator of BB-200 to install, use, wash and maintain, users should use the products according to this manual.

All relevant staff members should operate the products after reading manual carefully, if still having some puzzle, please contact with our company in order to offer detailed materials.

All this manual data, picture are according to the newest products while publishing, because of improving or other reason, there maybe some differences between this manual's description and the real product, please forgive.

16 APPENDIX I

Guidance and declaration-electromagnetic emissions

Guidance and declaration-electromagnetic emissions		
Equipment is tended for use in the electromagnetic environment specified below. The customer or the user of this equipment should assure that is used in such an environment.		
Emission test	**Compliance level**	**Electromagnetic environment-guidance**
RF emission CISPR 11	Group1	This equipment used RF energy only for its internal function. Therefore, its RF emission are very low and aren't likely to cause any interference in nearby electronic equipment.
RF emission CISPR 11	Class A	This equipment is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emission IEC61000-3-2	Not applicable	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Not applicable	

Recommended separation distances between portable and mobile RF communications equipment and the EQUIPMENT or SYSTEM

Recommended separation distances between portable and mobile RF communications equipment and this equipment			
This equipment is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of this equipment can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and this equipment as recommended below, according to the maximum output power of the communications equipment.			
Rated maximum output power of transmitter (W)	**Separation distance according to frequency of transmitter (m)**		
	150kHz to 80MHz $d=\left[\frac{3.5}{V_1}\right]\sqrt{P}$	80MHz to 800MHz $d=\left[\frac{3.5}{E_1}\right]\sqrt{P}$	800MHz to 2.5GHz $d=\left[\frac{7}{E_1}\right]\sqrt{P}$
0.01	0.117	0.117	0.233
0.1	0.369	0.369	0.738
1	1.167	1.167	2.333
10	3.689	3.689	7.379
100	11.667	11.667	23.333
For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer. NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.			

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Guidance and declaration-electromagnetic immunity

<table>
<tr><td colspan="4">Guidance and declaration-electromagnetic immunity</td></tr>
<tr><td colspan="4">This equipment is tended for use in the electromagnetic environment specified below. The customer or the user of this equipment should assure that is used in such an environment.</td></tr>
<tr><td>Immunity test</td><td>IEC60601 test level</td><td>Compliance level</td><td>Electromagnetic environment-guidance</td></tr>
<tr><td></td><td></td><td></td><td rowspan="4">Portable and mobile RF communications equipment should be used no closer to any part of this equipment, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter Recommended separation distance
$d=\left[\frac{3.5}{V_1}\right]\sqrt{P}$
$d=\left[\frac{3.5}{E_1}\right]\sqrt{P}$ 80MHz to 800MHz
$d=\left[\frac{7}{E_1}\right]\sqrt{P}$ 800MHz to 2.5GHz
Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strength from fixed RF transmitters, as determined by an electromagnetic site survey [a], should be less than the compliance level in each frequency range [b].
Interference may occur in the vicinity of equipment marked with the following symbol:
  </td></tr>
<tr><td>Conducted RF
IEC 61000-4-6</td><td>3V rms
150KHz-
80MHz</td><td>3V rms</td></tr>
<tr><td>Radiated RF
IEC 61000-4-3</td><td>3V/m
80MHz-2.5G
Hz</td><td>3V/m</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td colspan="4">Note 1 At 80MHz and 800MHz, the higher frequency range applies.
Note 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</td></tr>
<tr><td colspan="4">[a] Field strength from fixed transmitters, such as base stations for radio telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, and electromagnetic site survey should be considered. If the measured field strength in the location in which this equipment is used exceeds the applicable RF compliance level above, this equipment should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating this equipment
[b] Over the frequency range 150KHz to 80MHz, field strength should be less than 3V/m.</td></tr>
</table>

Guidance and declaration-electromagnetic immunity

Guidance and declaration-electromagnetic immunity			
This equipment is tended for use in the electromagnetic environment specified below. The customer or the user of this equipment should assure that is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment-guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	±6kV contact ±8kV air	±6kV contact ±8kV air	Floors should be wood, concrete or ceramic tile. If floor are covered with synthetic material, the relative humidity should be at least 30%
Electrical fast transient/burst IEC 61000-4-4	±2kV for power supply lines ±1kV for input/output lines	±2kV for power supply lines ±1kV for input/output lines	Mains supply quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1kV differential mode ±2kV common mode	±1kV differential mode ±2kV common mode	Mains supply quality should be that a typical commercial or hospital environment.
Voltage dips, short interruptions and Voltage variations on power supply input lines IEC 61000-4-11	<5%U (>95% dip in U) for 0.5 cycle 40%U (60% dip in U) for 5 cycle 70%U (30% dip in U) for 25 cycle <5% U (>95% dip in U) for 5s	<5%U (>95% dip in U) for 0.5 cycle 40%U (60% dip in U) for 5 cycle 70%U (30% dip in U) for 25 cycle <5% U (>95% dip in U) for 5s	Mains supply quality should be that a typical commercial or hospital environment.
Note: U is the a.c. mains voltage prior to application of the test level.			

PT. SINKO PRIMA ALLOY

Alamat : Jl. Tambak Osowilangun Permai No. 61, pergudangan osowilangun permai Blok E7-E8, Surabaya-Indonesia (60191)

Telepon : 031-7482816

Fax. : 031-7482815

Aftersale (WA) : 0821-4281-7085

Email : aftersales@elitech.co.id
sinkoprima@gmail.com

Website : www.elitech.id

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